

WHAT IS CLAIMED IS:

1. A method of semiconductor device isolation, which comprises the steps of:

providing a semiconductor substrate where a device isolation region was defined;

5 forming a mask on the substrate in such a manner that the device isolation region is exposed through the mask;

etching the substrate using the mask to form a trench;

thermally treating an inner wall of the trench using

10 the mask under a hydrogen atmosphere;

forming a first insulating layer covering the resulting inner wall of the trench;

forming a second insulating layer on the mask in such a manner that the second insulating film covers the first

15 insulating film;

firstly etching the second insulating layer to expose a surface of the mask;

removing the mask;

secondly etching the remaining second insulating layer

20 until a surface of the substrate is exposed, thereby forming a device isolation film.

2. The method of Claim 1, in which the thermal treatment is carried out at a temperature of 600 °C to 1300

°C.

3. The method of Claim 1, in which the first insulating layer is formed using an epitaxial growth process.

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4. The method of Claim 1, in which the first and second etching steps for the second insulating layer are carried out using a chemical mechanical polishing (CMP) process or an etch back process.

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5. A method of semiconductor device isolation, which comprises the steps of:

providing a semiconductor substrate where a device isolation region was defined;

15 successively forming a buffer oxide film and a silicon nitride film on the substrate;

forming a photoresist pattern on the silicon nitride film in such a manner that the device isolation region is exposed through the photoresist pattern;

20 etching the silicon nitride film, the pad oxide film and the substrate using the photoresist pattern as a mask to form a trench;

removing the photoresist pattern;

thermally treating an inner wall of the trench under a

hydrogen atmosphere using the remaining silicon nitride film as a mask;

forming an epi-layer covering the resulting inner wall of the trench;

5 forming an insulating layer on the remaining silicon nitride film in such a manner that the insulating layer covers the epi-layer;

firstly etching the insulating layer to expose a surface of the remaining silicon nitride film;

10 removing the remaining silicon nitride film;

secondly etching the remaining insulating layer until a surface of the substrate is exposed, thereby forming a device isolation film.

15 6. The method of Claim 1, in which the thermal treatment is carried out at a temperature of 600 °C to 1300 °C.

7. The method of Claim 1, in which the first and 20 second etching steps for the insulating layer are carried out using a chemical mechanical polishing (CMP) process or an etch back process.